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ABSTRACT

The Mastery Learning (ML) program in New York City high schools allows teachers to divide course curriculum for English, science and social studies into small learning units which pupils master at their own speed. After a number of units have been completed, summative tests are given. Program goals include better attendance, achievement, and attitudes than are found among students in comparable non-ML classes. This assessment of the 1984-85 ML programs at five Bronx schools includes the following: (1) an introductory discussion of the program's philosophy, background, goals, and objectives, plus information on evaluation methodology and the scope of this report; (2) an in-depth description of program structure, implementation, and activities; (3) outcome data; and (4) conclusions and recommendations. The evaluation found that a number of the program's goals were met and there was a trend towards better performance by students in ML classes. But there was no significant difference between the number of students passing the summative test in ML classes and those passing the same examination in non-ML classes. Technical support goals were only partially met. There was also considerable variety in the way ML techniques were used in the classroom. (PS)

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MASTERY LEARNING PROGRAM

1984 - 1985

FINAL REPORT

OEA Evaluation Report

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Evaluation Section Report
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MASTERY LEARNING PROGRAM

1984 - 1985

FINAL REPORT

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SUMMARY

The Mastery Learning (M.L.) program is a structured sequence of activities designed to enable students with differential learning to prosper from instruction in a traditional classroom setting. M.L. teachers divide the course curriculum into small learning units, define learning objectives for each unit, and clearly communicate these objectives to the students. When the students have completed the unit, the teacher administers a diagnostic test known as an "A" test to determine what aspects of the unit have been mastered. Those students who have answered correctly 80 percent of the test items are defined as mastery students and given "enrichment" activities which expand on various aspects of the unit, while "non-mastery" students are given "corrective" exercises which focus on the aspects of the unit they had not mastered. The teacher then administers a "B" test to the non-mastery students to determine the effectiveness of the corrective instruction. After completing a number of units in this fashion, students are given a "summative" examination which covers the material presented in all of the units and serves as the primary basis for the course grade.

M.L. was first introduced to New York City schools in the summer of 1978 with the training of eight teachers in two schools. Since that time, Mastery Learning techniques have been used by nearly 300 teachers in about one-third of N.Y.C.'s public high schools. A number of sample teaching materials have also been developed by M.L. teachers and teacher-trainers.

The 1984-85 M.L. program had a number of student outcome objectives, including better attendance, achievement, and attitudes than students in comparable non-Mastery Learning classes. Other goals of M.L. program administrators were to increase the number of trained M.L. teachers using M.L. techniques in at least one of their classes, and to provide enhanced technical support to these teachers in the form of additional secretarial assistance, the provision of Scantron test correcting machines, and the preparation and distribution of "libraries" of M.L. sample materials.

Program outcomes indicate that a number of these objectives were met. Significantly fewer students failed Mastery Learning classes than failed non-Mastery Learning classes because of poor attendance, and the large majority of M.L. students believed that it was easier to learn in M.L. classes than in other types of classes. However, while there was a trend towards better performance by students in M.L. classes, there was no statistically significant difference between the number of students passing the summative test in M.L. classes and students passing the same summative examination in non-M.L. classes.

The program objective of increased use of M.L. techniques was met. Eighty-eight percent of the teachers in the sample used

M.L. techniques in at least one of their classes, and most of the remaining 12 percent failed to use the techniques only because they were transferred to a school where M.L. was not employed. The technical support goals were only partially met. While additional secretarial support was provided to all of the schools in the sample, only about two-thirds of the M.L. teachers made use of this assistance because of the relatively long lead time needed to get prepared materials back in a timely fashion. About one-half of the teachers used the sample materials provided; many of the teachers who did not utilize these materials stated that their teaching style was too "individualistic" to enable them to make efficient use of prepared materials. Scantron machines were available at only a portion of the sample schools; of those receiving this equipment, a majority of the teachers found them useful.

There was considerable variety in the way in which M.L. techniques were employed in the classroom. Teachers varied such elements as length of the unit being taught, amount of time between A and B tests, and administration of the summative test.

Among the recommendations included in the report are the following:

- Program administrators should closely analyze the specific needs of M.L. teachers to determine what types of technical support are desired and most effective.

- Patterns of program implementation should be carefully studied to determine whether some aspects of the M.L. approach should be required, stressed, or modified with different types of students.

TABLE OF CONTENTS

		PAGE
I.	Introduction	1
	Program Philosophy and Background	1
	1984-85 Program Goals and Objectives	2
	Evaluation Methodology	3
	Scope of this Report	5
II.	Program Implementation	6
	Program Staff	6
	Classroom Implementation of M.L. Techniques	10
III.	Outcome Data	17
	Teacher Utilization of Mastery Learning Techniques	17
	Teacher Utilization of Technical Support	20
	Student Achievement	22
	Program Effect on Student Attitudes	26
IV.	Conclusions and Recommendations	29
	Conclusions	29
	Recommendations	32

LIST OF TABLES

TABLE		PAGE
1	Mainstream and Non-Mainstream Teachers' Mean Ratings of the Use of Mastery Learning Techniques	19
2	Summary of Teachers' Use of Individual Technical Support Components	21
3	Mainstream and Non-Mainstream Teacher Mean Ratings of Available Technical Support Components	23
4	Average Percentage of Students Passing Summative or Final Exams and Failing Course Due to Poor Attendance	25
5	Percentage of Student Agreement with Attitudinal Statements	27

I. INTRODUCTION

PROGRAM PHILOSOPHY AND BACKGROUND

Based on Benjamin Bloom's premise that students are not "good" and "poor" learners but rather "fast" and "slow" learners, the Mastery Learning (M.L.) program provides teachers with techniques and procedures designed to accommodate students' varied learning rates within a traditional classroom setting. Mastery Learning accomplishes this through a structured sequence of activities. In the M.L. sequence, a teacher divides the term's curriculum into small learning units. For each unit, the teacher defines the learning objectives and clearly communicates these to the students in traditional group instruction. When students have completed the unit, the teacher administers a diagnostic ("formative") test, commonly referred to as the "A" test, to determine which aspects of the unit the students have mastered and which need further study. Mastery is usually defined as having answered 80 percent of the test items correctly. Students who have achieved mastery are given enrichment activities which expand on various aspects of the unit, while students who did not achieve mastery are given "corrective" exercises which focus on the aspects of the unit they did not master. A second diagnostic test (the "B" test) is then given to the latter group to determine the effectiveness of the corrective instruction. After completing a number of units in this fashion, students take a "summative" examination which includes the materials in all of the units and serves as the primary basis for the course grade.

M.L. was first introduced to New York City schools in the summer of 1978 with the training of eight teachers in two schools. Since that time, M.L. techniques have spread to 38 high schools and are being utilized by approximately 300 teachers. A large body of M.L. sample teaching materials has also been developed by M.L. teachers and trainers, including units in ninth and tenth grade fundamental or Regents Competency Test mathematics, algebra, geometry, ninth grade social studies, English, and general science.*

1984-85 PROGRAM GOALS AND OBJECTIVES

The New York City Mastery Learning program is under the direction of a mastery learning coordinator, who is responsible for the overall administration of the program in all five boroughs. This administrator defined a number of objectives for students receiving instruction in Mastery Learning classrooms during the 1984-85 school year:

- Significantly more students in Mastery Learning classes will pass the summative examination than will students in matched non-Mastery Learning classes taking a final examination.
- Significantly fewer students will fail Mastery Learning classes because of poor attendance than will students in matched non-Mastery Learning classes.**

*A complete list of available materials can be obtained from the Mastery Learning Coordinator.

**Students designated as "attendance failures" fail a class based on excessive absences alone, regardless of academic performance.

- Students participating in M.L. classes will consider these classes better learning experiences than classes in which they participated the previous year or other classes which they are presently taking, as measured by their responses on an attitude survey.

- Students participating in M.L. classes will indicate that they are more confident of their learning abilities than they were prior to entering M.L. classes, as measured by their responses to an attitude survey.

The M.L. coordinator also established two programmatic goals for the 1984-85 program:

- Teachers who have participated in Mastery Learning workshops will use Mastery Learning techniques (i.e., diagnostic tests, corrective exercises, enrichment activities, and summative tests) in at least one of their classes.

- Mastery Learning teachers will receive enhanced technical support in the form of additional secretarial assistance, Scantron machines*, and libraries of sample M.L. materials.

EVALUATION METHODOLOGY

O.E.A.'s evaluation of the 1984-85 Mastery Learning program centered on five high schools in the Bronx. Two of these schools -- Dewitt Clinton and Grace Dodge --had teachers who had utilized Mastery Learning techniques previously, while the remaining three schools -- James Monroe, Samuel Gompers, and Theodore Roosevelt -- had teachers who were being trained in M.L. techniques for the first time.

*Scantron machines are used to score objective tests and provide profiles of class performance on individual test items -- activities which require considerable time to complete by hand.

At the request of the program administrator, the evaluation team selected both mainstream and non-mainstream* M.L. classes for evaluation and analysis. Classes visited included a "modified" social studies class for students with poor English reading skills, a PREP social studies class, an English as a Second Language (E.S.L.) class, a ninth grade general science class, two industrial arts classes, and a Health Conservation class on job skills for special education students. Evaluators observed the classes being taught, had informal discussions with the class teachers, and administered a structured questionnaire to a sample of M.L. students, and to one of the teachers in each of the five Bronx schools who were trained in M.L. techniques during the 1984-85 school year. Evaluators also interviewed an M.L. coordinator and two principals.

The evaluation included analyses of performance data for both Mastery Learning students and students in matched non-Mastery Learning classes. These data included the number of students participating in each class, the number of students who passed the summative or final examination, the number of students who passed the course for the term, and the number of students who failed the course because of poor attendance. Comparison classes consisted of either the same course taught by the same

*As used here, non-mainstream refers to special groups of students such as special education students, students enrolled in English as a Second Language (E.S.L.) classes, and students participating in PREP (a theme-based program of remediation for incoming ninth and tenth graders).

teacher using non-M.L. techniques or the departmental results for that course.

SCOPE OF THIS REPORT

This report is organized into four chapters. An in-depth description of program structure and the implementation of program activities is presented in Chapter II. An analysis of quantitative data related to M.L. techniques, technical support, and student performance/attitudes appears in Chapter III. The final chapter contains conclusions and recommendations for program modifications.

II. PROGRAM IMPLEMENTATION

PROGRAM STAFF

The Mastery Learning program is used by individual schools and teachers on a voluntary basis. Program staff was limited to two administrators, a coordinator, and a networker. The M.L. coordinator's office was located at the Board of Education's central offices in Brooklyn. His responsibilities included administering the program in all five boroughs, planning and conducting training programs and workshops in M.L. techniques, providing needed technical assistance to schools and teachers implementing Mastery Learning techniques in the classroom, and disseminating information about the program to schools and to the public. The coordinator was assisted by a Mastery Learning networker, who conducted in-school training sessions and provided technical assistance and support to Mastery Learning teachers via site visits, demonstration lessons, and workshops.

Technical Support and Training

One of the primary objectives of the 1984-85 M.L. program was to provide increased technical support to teachers using M.L. techniques in their classrooms. Accordingly:

- Per-session secretarial time was allocated to schools employing M.L. This provided a limited number of hours for secretaries to type formative and summative tests and corrective and enrichment materials, and to perform other clerical duties required of M.L. teachers.

- Schools with M.L. teachers were provided with the information necessary to acquire Scantron machines.

- Program administrators merged materials created by M.L. teachers during workshops or individually into program packages ("libraries") for individual subject areas. These packages were then distributed to other schools which had M.L. teachers teaching these subjects.

In addition to these forms of technical support, program administrators planned and implemented various types of training in Mastery Learning techniques during the 1984-85 school year, including a summer workshop, a series of 14 workshops held throughout the year for teachers who had previously been trained in M.L. techniques, and training sessions held in the schools on an as-needed basis. During spring, 1984, borough superintendents and the M.L. coordinator sent notices to school administrators to recruit teachers for summer M.L. training.

Summer Training

Among the five Bronx sample schools, 39 teachers participated in the training, which was provided by the M.L. coordinator, the M.L. networker, and teacher-trainers who had already used M.L. techniques in their classrooms. The workshop began on July 5th and ran 10 days, ending on July 18, 1985.

Daily activities ran from 9:00 a.m. to 1:00 p.m. Sessions included presentations on general topics such as "The Philosophy and Theory of Mastery Learning" and on specific M.L. techniques such as "Formative and Summative Tests" and "Correctives and Enrichment Materials." These presentations provided detailed explanations of procedures, including samples of materials developed for specific classes. Several sessions included subject workshops in which teachers of English, science, social

developed for specific classes. Several sessions included subject workshops in which teachers of English, science, social studies, and other classes met in groups to construct their own curriculum materials. During these sessions, teachers were encouraged to bring up issues they considered problematic. Examples included: "Should A and B tests count toward course grades?"; "What happens if a class doesn't complete enough lessons to warrant administering a summative test at the end of a term?"; and "How do you convince a department chairperson to support M.L.?"

After-School Workshops

In addition to the summer training workshop, Mastery Learning Program staff conducted a series of workshops for teachers trained in M.L. techniques within the last year. These workshops were geared toward teachers who were currently teaching at least one M.L. class and who wanted the opportunity to prepare course materials with the aid of training personnel. The workshops occurred approximately twice a month from October through May, were conducted at central locations, and lasted approximately two hours each, with participating teachers receiving per-session payments at standard rates. The program coordinator, program networker, and/or other training personnel attended each session, monitored activities, and provided direction when needed.

Workshop attendance varied, depending on the date and the site involved. In the case of the two workshops attended by

O.E.A. evaluators, attendance ranged from eight to 20 people. Teachers worked either independently or in groups of three or four, with more experienced teachers assisting those who were recently trained. The majority of time was spent preparing M.L. materials such as lesson plans, correctives, and enrichment materials, but teachers also shared their experiences in using M.L. techniques and suggested solutions to various types of classroom problems.

Teachers said that one reason such workshops are valuable is that the preparation of M.L. materials is very time-consuming and they usually do not have enough time for this in their regular schedules.* Most said that they work separately in developing their materials, but a group of three history teachers at one workshop said they work together in school "when they reach the same spot in the curriculum," and other teachers indicated that they "look to other M.L. teachers in their school for support and guidance" from time to time.

*The program coordinator stated in a separate interview that when the M.L. program first began, each participating teacher was given .2 units of free time to develop lesson plans and tests, but now that the program has been in effect for some time, only teachers new to M.L. are given free time for workshops. Furthermore, several schools with a large number of M.L. teachers (such as Edward R. Murrow High School which currently has 35-40 teachers using M.L.) give one of the teachers .2 units of time to coordinate the program, train other teachers, and coordinate needed secretarial service.

In-School Training

In addition to the summer and school-year workshops provided by M.L. program administrators, the program networker conducted in-house training sessions at many M.L. schools during the regular school year. These sessions were organized primarily to offer M.L. training to teachers who either were unable to participate in the summer training or had become interested in learning the approach during the school year. These sessions were shortened versions of the summer program, lasting two hours on each of four days. However, the same material was covered as during the summer workshop because of the smaller number of participants.

CLASSROOM IMPLEMENTATION OF M.L. TECHNIQUES

The number of students present in the M.L. classes observed by evaluators did not exceed 15 in any instance, although most teachers indicated that the class register was higher. In each class observed, the teacher began the period by writing on the board the tasks to be completed that day or before the next class.

After working with the group as a whole for a brief period of time, the teacher instructed the students to work individually. Most teachers moved around the room assisting individual students, but in one instance, the teacher remained seated at the front of the room and quietly asked individual students to come discuss their work with him in turn. The

students generally remained quiet and absorbed in their work for the entire period.

Staff Descriptions of M.L. Implementation

Reasons for using M.L. Since M.L. is a technique which is used on a voluntary basis, teachers and administrators were asked why they chose to use this pedagogical approach. They gave various reasons. One administrator said that he had read about the program in bulletins and wanted to start using it in his school because he wanted the students to achieve more. Another said he believed that it was an excellent methodology for getting students at all levels to achieve more successfully. Several of the teachers (all of whom had at least five years of teaching experience) said that they had believed it would be effective with their students -- particularly those who had weak reading skills or were slow learners and needed this special kind of help. However, several teachers also noted that because of the extra work involved, they could only use M.L. in one class at a time if new materials for the class had to be developed, and a few stated that although M.L. was excellent for many students, more advanced students might find the pace too slow. A few teachers also suggested that certain fields such as history and science, which are highly structured and have many teaching materials available, might lend themselves more to M.L. than others, such as economics.

Curriculum organization. Although each of the teachers utilized the basic elements of Mastery Learning instruction

(dividing the curriculum into small units, administering A and B tests, etc.), there was considerable diversity in how they utilized these components. Some teachers broke the material into four- or five-session units, while others had units that lasted as long as two weeks. All teachers administered an "A" test at the end of the unit, but several gave the students "review sheets" or intensive drill in the material just covered before administering the test. The A and B tests included various types of items, including multiple-choice, "fill-ins," and essays, although one teacher noted that many of the youngsters in his class did not have good writing skills and had difficulty answering essay questions. In most cases, the A test lasted only part of the period, but in some instances, the test could take longer. Furthermore, the "cutoff" point for mastery was set at 85 percent rather than 80 percent by the majority of teachers interviewed. In most cases fewer than 25 percent of the students ever achieved mastery on the first test.

The corrective and enrichment activities taking place between the A and B tests were also varied. For example, the correctives in a lesson on the scientific revolution in one M.L. history class consisted of an essay in which students had to fill in the blanks from a list on an attached sheet. The essay was made up of statements taken from the "A" test students had previously failed. Another corrective directed students to use specific textbook pages to write a newspaper story based on a headline provided by the teacher. An example of an enrichment

activity from the same lesson involved a puzzle which required students to find a series of words embedded in the puzzle. Another enrichment activity gave students a reading about the Reformation and asked them to complete a series of comprehension questions about the reading. In a few cases, the corrective and enrichment materials given students were the same, although mastery students were expected to complete them faster. One teacher had all of the students do the correctives and then had mastery students work on enrichment materials while he administered the B test to students who had failed to reach the cutoff point in the A test. (In other words, the mastery students did not have to take the B test.) Some mastery students had the choice of either taking the B test, to see if they could get an even better score, or working on enrichment materials while the B test was being given. In at least one case, the B test was regarded as an optional test for all students, but those who scored less than 80 on the A test were strongly encouraged to take the B test.

The types of materials provided as correctives or enrichments were often varied and imaginative. Teachers made up charts, drew cartoons, or constructed crossword puzzles from the course material that was being studied in that unit. For correctives, one teacher gave the students the answers for various questions and then asked them to provide explanations for these answers, so that they would "gain independence by working toward synthesis into higher skills." In many cases, the

enrichment material paralleled the information already studied in the unit, but at a higher, more taxing reading level. It was also fairly common for the teachers to ask the mastery students to help the non-mastery students with their work.

The length of time between the administration of the A and B tests varied dramatically. In one instance, the teacher administered the B test the day after the A test (which was always given on Thursday) because he feared that the gap of the weekend was too long for these youngsters to do well on the B test. The more usual approach was to schedule the tests a week or two apart, so that students had plenty of time to work on correctives in the interim. Several teachers gave students corrective or enrichment materials to work on at home -- particularly the night before the B test was scheduled.

A number of teachers did not administer a "summative" test per se. Instead, they considered the B test to be a summative test, and/or averaged the various test grades to come out with the student's final mark. Others awarded the students the highest of the A or B test grades, while still others used repetitions of the A and B tests as midterm and final examinations.

Teachers' Perceptions of Student Response. Most of the teachers at the five Bronx schools visited by O.E.A. field staff concurred with the opinion expressed by workshop teachers that M.L. is a very powerful and useful technique for many students -- particularly those students who have language barriers or who

do not learn quickly. One teacher characterized the ideal M.L. student as "a decent kid who is slow -- that is, a student who cares but needs a lot of remedial work." Several concurred that M.L. students appreciate the opportunity to take a second test on the material that they've been studying, and that their classroom attendance is generally better because they have less "test anxiety." One teacher stated that a lot of the poorer students "would give up except for M.L.," and virtually all of the teachers agreed that the students learned the material more thoroughly and retained it longer than in a conventionally taught class. They identified the individual attention given the students as one of the most important elements in the success of M.L. -- and pointed out that they themselves also benefitted because they became more aware of the students as individuals.

Technical support. The amount of paperwork involved in M.L. instruction was a continuing concern of the teachers at the five Bronx sample schools. Most of them believed that "teaching styles" are too "individualistic" for them to make much use of the sample materials provided by the M.L. program office. Virtually all of them had ended up preparing a great deal (if not all) of their M.L. materials themselves -- a procedure which was very time-consuming. Few seemed to make much use of the secretarial help provided, sometimes because they found that the secretary had a great deal of difficulty reading their handwriting, and sometimes because the "time lag" between when they submitted their handwritten material and when the typed

material was available was too long. Most said that they did use the Scantron machine if one was available, and that it was very helpful because of the number of tests they had to give. Several also commented that one of the biggest problems was the need for adequate supplies, especially paper.

Other comments. A few other considerations were voiced repeatedly, one of which was the desire to have continuity of M.L. instruction from the fall to spring terms, or even from year to year. Teachers believed that it took time for students to become accustomed to this mode of instruction, and that once they had become familiar with it, they should have the opportunity to continue with it. However, an instructor at one of the vocational-technical schools noted that academic subjects had to be scheduled "around" the trade-related courses, and that this made it difficult to use M.L. with continuity. There was also some concern expressed that not as much material could be covered as in conventionally taught classes, so that M.L. students were in effect learning "less" than students in mainstream classes albeit they might be learning it somewhat "better."

III. OUTCOME DATA

The analyses presented in this chapter are based on responses to teacher and student questionnaires and on program records of student academic performance. Teacher questionnaires assessed teachers' utilization of Mastery Learning techniques and technical support components. Student questionnaires measured students' perspectives on the efficacy of Mastery Learning techniques. O.E.A. assessed the effect of Mastery Learning instruction on student performance by examining program records.

TEACHER UTILIZATION OF MASTERY LEARNING TECHNIQUES

The implementation objective stated that teachers who participated in Mastery Learning training workshops would use the Mastery Learning technique in at least one of their classes. This objective was assessed by mailing questionnaires to the 51 teachers from Bronx schools trained during the 1984-85 Mastery Learning Training Program. The following analyses are based on the responses of 33 of these 51 teachers.*

Teachers were asked whether or not they had implemented Mastery Learning during the 1984-85 school year. Data indicate that the objective was substantially met: 88 percent of the teachers reported they used Mastery Learning techniques in at

*Ten of the teachers trained "in house" during the 1984-85 school year were not included in these analyses because they were trained too late to employ Mastery Learning during that year. Eight of the remaining 41 teachers either left that school or were transferred during the 1984-85 school year and did not respond to the questionnaire.

least one class. Only four out of the 33 teachers indicated they did not implement Mastery Learning; of these, three indicated they had received new positions after the training which were not amenable to M.L., while the fourth indicated that he did not believe that the M.L. approach was a useful teaching strategy.

Teachers who reported using the M.L. method rated the extent of their use of individual elements (diagnostic tests, correctives, enrichment exercises, and summative tests), on a scale ranging from one ("not at all") to four ("always"). These questions were analyzed separately for teachers of mainstream and non-mainstream classes to determine if variations in the characteristics of students would affect the application of specific M.L. techniques. The results of this analysis are presented in Table 1. The analysis indicates that mainstream teachers tended to use correctives (3.8) more frequently than enrichment activities (3.3), and enrichment activities more frequently than summative tests (3.0). This corroborates statements made by teachers whose classrooms were visited by O.E.A. These teachers indicated that the majority of students fail to achieve mastery on the A diagnostic and are therefore assigned corrective rather than enrichment activities, and that some teachers have <u>all</u> students work on correctives. The lower rating for summative tests is explained by the fact that teachers administered those tests only once a term (if at all). The ratings for teachers of non-mainstream classes are similar; however, the means for enrichment activities and summative

TABLE 1

Mainstream and Non-Mainstream Teachers' Mean Ratings of the use of Mastery Learning Techniques*

Technique	TYPE OF CLASS		
	Mainstream	Non-Mainstream**	Combined
Diagnostic Tests	3.1	3.0	3.0
Correctives	3.8	3.4	3.5
Enrichment	3.3	3.0	3.1
Summative Tests	3.0	3.2	3.1
N	12	17	29

* Teachers rated their use of individual techniques on a scale ranging from one (not at all) to four (always).

** The non-mainstream group includes six PREP A, four special education, and two E.S.L. teachers.

- Teachers in both mainstream and non-mainstream classes indicated that they administer correctives more frequently than any other program element.

summative tests are reversed, with teachers using enrichment (3.0) less frequently than summative tests (3.2). This finding suggests that fewer non-mainstream than mainstream students attained mastery on diagnostic tests; therefore, even fewer participated in enrichment activities.

TEACHER UTILIZATION OF TECHNICAL SUPPORT

The technical support objective stated that teachers who employed Mastery Learning techniques would be provided with technical support in the form of secretarial staff, Scantron machines, and sample material libraries. The evaluation team assessed this objective by asking the M.L. teachers in the sample to note their use of each support component on a scale ranging from one to four, with one indicating "not at all" and four indicating "always." The number of teachers who utilized each of the support components is presented in Table 2. As indicated in this table, the program objective for utilization of technical support was only partially met. While nearly two-thirds of the teachers (66 percent) indicated they had utilized the assistance of secretarial staff at least once, nearly one-half (45 percent) indicated they had not used any sample materials, and more than three-quarters (76 percent) indicated they had never utilized Scantron machines.

The reasons given for these differences in the use of technical support varied. In the case of the Scantron machines, the primary problem was that most of the schools had not received this equipment as yet, although a few teachers in the schools

TABLE 2

Summary of Teachers' Use of Individual Technical Support Components*

Support Component	Teachers Who Used Component N	%	Teachers Who Did Not Use Component N	%
Secretarial Staff	19	66%	10	34%
Scantron Machines	7	24	22	76
Sample Material Libraries	16	55	13	45

*Teachers rated their use of each support component on a scale ranging from one ("not at all") to four ("always"). Ratings of three or four were categorized as "Use of the Component."

- Two-thirds of the teachers employed the services of secretarial staff, while nearly one-half indicated they had not used any sample materials and three quarters indicated they had never utilized Scantron machines.

which did have a Scantron machine indicated that they did not find the machine "helpful enough." The use of secretarial help was limited by the fact that teachers were typically working against deadlines and could not wait for the material to be typed by a busy secretary, while the use of sample materials was limited by teachers' perceptions that the materials were "not satisfactory" or "not appropriate to the lesson [they were] giving in terms of content."

The technical support objective was examined to ascertain which technical support elements teachers considered most valuable. This analysis is summarized for mainstream and non-mainstream teachers in Table 3. As indicated in the table, mainstream teachers used Scantron machines (3.5) more often than sample materials (2.9) or secretarial staff (2.7). This order was reversed for teachers of non-mainstream classes, who indicated they used secretarial staff (2.8) more often than sample material libraries (2.5) and Scantron machines (1.8). However, except in the case of Scantron machines, the differences in usage by the two categories of teacher were negligible.

STUDENT ACHIEVEMENT

The evaluation team examined summative exam grades and attendance failures to assess the impact of Mastery Learning instruction on student achievement. Mastery Learning teachers in the sample reported the number of students who passed their final exams and the number who failed a comparable course because of excessive absences for both Mastery Learning and comparison

TABLE 3

Mainstream and Non-Mainstream Teacher Mean Ratings of Available Technical Support Components*

Support Component	TYPE OF CLASS		
	Mainstream	Non-Mainstream	Combined
Secretarial Staff	2.7	2.8	2.7
Scantron Machines	3.5	1.8	2.6
Sample Material Libraries	2.9	2.5	2.7

* Teachers rated their use of each support component on a scale ranging from one ("not at all") to four ("always").

- Mainstream teachers utilized Scantron machines more often than material libraries and secretarial staff.
- Non-mainstream teachers used secretarial staff more often than material libraries and libraries more often than Scantron machines.

classes.* Sixty-one percent (20) of the Mastery Learning teachers in the sample, provided data for their students, but only 36 percent also provided appropriate comparison data from students in comparable non-M.L. classes. These data were used in the following analyses.

The program objective stated that a significantly larger number of students in Mastery Learning classes would pass the summative or final exam than would matched students in non-Mastery Learning classes. The percentage of Mastery Learning (78.2 percent) and non-Mastery Learning (70.6 percent) students who passed their summative or final exams is presented in Table 4. A t-test for paired samples indicated no significant difference between the two groups; therefore, the program objective was not met. There was, however, a trend towards better performance in the Mastery Learning classes.

The attendance failure objective stated that significantly fewer students would fail Mastery Learning classes than would fail non-Mastery Learning classes because of poor attendance.** The percentage of attendance failures in Mastery Learning and non-Mastery Learning comparison classes is also presented in Table 4. This objective was met ($t(19)=4.3$, $p<.005$).

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*Comparison classes consisted of either the same course taught by the same teacher using non-Mastery Learning techniques or the departmental results for that course.

**Students designated as "attendance failures" failed a class based on excessive absences alone, regardless of academic performance.

TABLE 4

Average Percentage of Students Passing Summative or Final Exams and Failing Course Due to Poor Attendance

Outcome	No. of Classes	TYPE OF CLASS: Mastery Learning Mean	Mastery Learning S.D.	Non-Mastery Learning Mean	Non-Mastery Learning S.D.	Mean Difference
Passing Exam	20	78.2%	22.7	70.6%	21.2	7.6
Attendance Failure*	20	16.3	12.8	29.8	16.2	13.5**

* Students designated as "attendance failures" failed a class based on excessive absences alone, regardless of academic performance.

** [t (19) = 4.3, p < .005]

- Significantly fewer Mastery Learning than comparison students failed their classes because of poor attendance.
- More Mastery Learning than control students passed their final exams, although this difference was not statistically significant.

PROGRAM EFFECT ON STUDENT ATTITUDES

There were two program objectives concerning student attitudes: 1) M.L. students would consider Mastery Learning classes better learning experiences than their non-Mastery Learning classes during either the previous or the present year: and 2) Mastery Learning students would believe that Mastery Learning classes made them more confident of their learning abilities. The evaluation team administered a structured questionnaire to students enrolled in Mastery Learning classes to assess these objectives. Students rated their level of agreement with a variety of statements concerning the efficacy of Mastery Learning instruction. Students' responses are categorized in Table 5.

As indicated in Table 5, most students found Mastery Learning classes easier to learn in than other classes they had either last year (88 percent) or this year (80 percent). Almost all (89 percent) students indicated that Mastery Learning classes helped them to feel confident that they could learn.*

The majority of students had favorable views of individual instructional techniques. Ninety-four percent stated that correctives were helpful, and only a small percentage believed A and B tests (14 percent) and enrichment activities (23 percent)

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*Program administrators had expressed interest in comparing the attitudes of M.L. students in bilingual and non-bilingual classes and of students with different grade point averages. These analyses showed no meaningful differences in attitudes and are thus not reported.

TABLE 5

Percentage of Student Agreement with Attitudinal Statements*

Item	Agreement
It's easier to learn in Mastery Learning class than in other classes I had last year.	88%
It's easier to learn in Mastery Learning class than in other classes I have this year.	80
Mastery Learning class helps me feel confident that I can learn.	89
Having A and B tests is a waste of time.	14
Correctives help me to learn things I have trouble with.	94
Enrichment activities are boring.	23
I would like to take more Mastery Learning classes.	88

* Students indicated whether they agreed or disagreed with each item. Only percentage agreement is reported in this table.

- Students with varying levels of achievement had similar attitudes towards Mastery Learning instruction.
- Most students had favorable views of Mastery Learning in general and of specific M.L. techniques.

were a waste of time or boring. Finally, most students (88 percent) indicated they would like to take other Mastery Learning classes in the future.

IV. CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

First introduced into New York City's public schools on a limited basis in 1978, several hundred teachers used the Mastery Learning program of instruction in more than three dozen schools by the beginning of the 1984-85 school year. Program administrators established a number of goals and objectives for that school year, including improved achievement and attitudes on the part of students receiving Mastery Learning instruction, improved technical support provided to schools and teachers utilizing Mastery Learning instructional methods, and greater employment of Mastery Learning techniques by teachers who had received training in their application.

The evaluation conducted by the Office of Educational Assessment/High School Evaluation Unit indicates that some but not all of these goals and objectives were met. These outcomes are summarized below.

Technical Support Provided to M.L. Schools and Teachers

As planned, program administrators allocated per-session time for secretarial services to targeted M.L. schools, provided schools with M.L. teachers with the information necessary to acquire Scantron machines, and compiled and distributed libraries of sample materials in selected subject areas to M.L. schools. However, the utilization of this support by M.L. teachers was somewhat lower than anticipated. While about two-thirds of the

teachers in the sample used the allocated secretarial time to prepare M.L. materials, only about one-half of the teachers utilized the sample materials, and roughly one-fourth used a Scantron machine to grade diagnostic or summative tests. In the case of the Scantron machines, a substantial number of the schools eligible to receive them had not received them by the time O.E.A. visited the site. However, some teachers who did have them available did not find them particularly useful, for reasons that were not specified. A number of teachers also found that the sample materials provided were not particularly useful to them -- perhaps because, as one teacher said, "teaching styles are too individualistic" for them to make effective use of materials prepared by others. It is also possible that the materials provided need additional refinement and development before they can be of maximum usefulness. While the secretarial assistance provided was used by a larger percentage of the teachers in the sample, a number of teachers said that it took too long to get their materials back. This would suggest that even more secretarial assistance may be needed to be of maximum usefulness to M.L. teachers. There did not seem to be substantial differences in utilization of these technical support elements by mainstream and non-mainstream teachers, although this lack of difference may be partially a function of the relatively small sample involved.

Implementation of M.L. Techniques by Teachers

One of the stated programmatic objectives was that teachers who had participated in M.L. workshops would use M.L. techniques in at least one of their classes. Of the 51 teachers from Bronx schools trained in M.L. techniques during the 1984-85 school year, about one-third were either trained too late to employ M.L. techniques during the school year or had changed schools by the time the program evaluation was conducted. Of the remaining 33 teachers, 29 (88 percent) utilized M.L. techniques in at least one class during the year, and of the other four teachers, only one indicated that he did not believe M.L. to be a useful teaching strategy. Thus, this program objective was substantially met.

Although teachers used the same basic M.L. techniques, there was considerable diversity in such elements as the number of units into which curriculum material was divided, the number of diagnostic tests administered during the term, the length of time between the A and B tests, and whether summative tests were administered at all. Furthermore, there seemed to be some variation in the use of M.L. techniques by mainstream and non-mainstream teachers. Program administrators should examine these aspects of M.L. utilization to determine the degree to which these modifications meet the needs of particular classes.

Student Outcomes

Program objectives in regard to student achievement were only partially met. While significantly fewer students failed

M.L. classes than failed comparable non-M.L. classes because of poor attendance, the percentage of M.L. students passing the summative examination was not significantly larger than the percentage of non-M.L. students passing their final exam. However, there was a trend toward better performance in M.L. classes.

Program objectives in terms of improved student attitudes toward their learning experiences and abilities were met. About four-fifths of the M.L. students polled indicated that they found learning in M.L. classes easier than in other classes, and that they wanted to take more M.L. classes in the future. However, students' perceptions were not borne out in their actual performance on summative tests although there was a trend towards better performance in M.L. classes. This trend may have been more pronounced if a larger number of students had summative exam scores available for analysis.

RECOMMENDATIONS

1. Program administrators should closely analyze the specific needs of M.L. teachers to determine what types of technical support are desired, and most effective.

2. Patterns of program implementation should be carefully studied to determine whether some aspects of the M.L. approach should be required, stressed, or modified with different types of students.

3. Consideration should be given to providing on-going training for teachers already implementing M.L.